

**REPORT ON THE ACTUAL HOSPITAL
COST OF CLEARLY IDENTIFIABLE
ALCOHOL AND DRUG DEPENDENCIES**

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COST OF CLEARLY IDENTIFIABLE
ALCOHOL AND DRUG DEPENDENCIES**

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EXECUTIVE SUMMARY

A study was undertaken of patients in whom alcohol or drug dependency had induced disease of a florid recognizable type and in whom, virtually all costs could be attributed to the dependency. In the Royal Jubilee Hospital, we identified 556 in-patient encounters of this type, of a total of 8973 encounters for the hospital as a whole (6.2%). Methods of identification included consideration of the ICD9-CM code, DRG, Chemical Dependency Team referral, and historical review.

The costs associated with this small sub-group are considerable. It is calculated that \$3,100,000 represents the expenditure on these patients annually, with a daily cost varying with the length of stay and ranging from \$286 to \$813, with an average daily cost per patient of \$470. It must be remembered that these patients represent only a narrowly defined subset of the alcohol or drug dependent hospital patient population. Extrapolation of these figures, based on hospital admissions suggest a provincial expenditure for this subset alone of \$72,000,000.

Our study suggests a substantial under reporting of this type of patient; reasons for this are discussed and potential for more accurate reporting is suggested. All costs in this study, unlike most other reported costing exercises, are directly case related and measure the service actually given to the patient whilst in hospital.

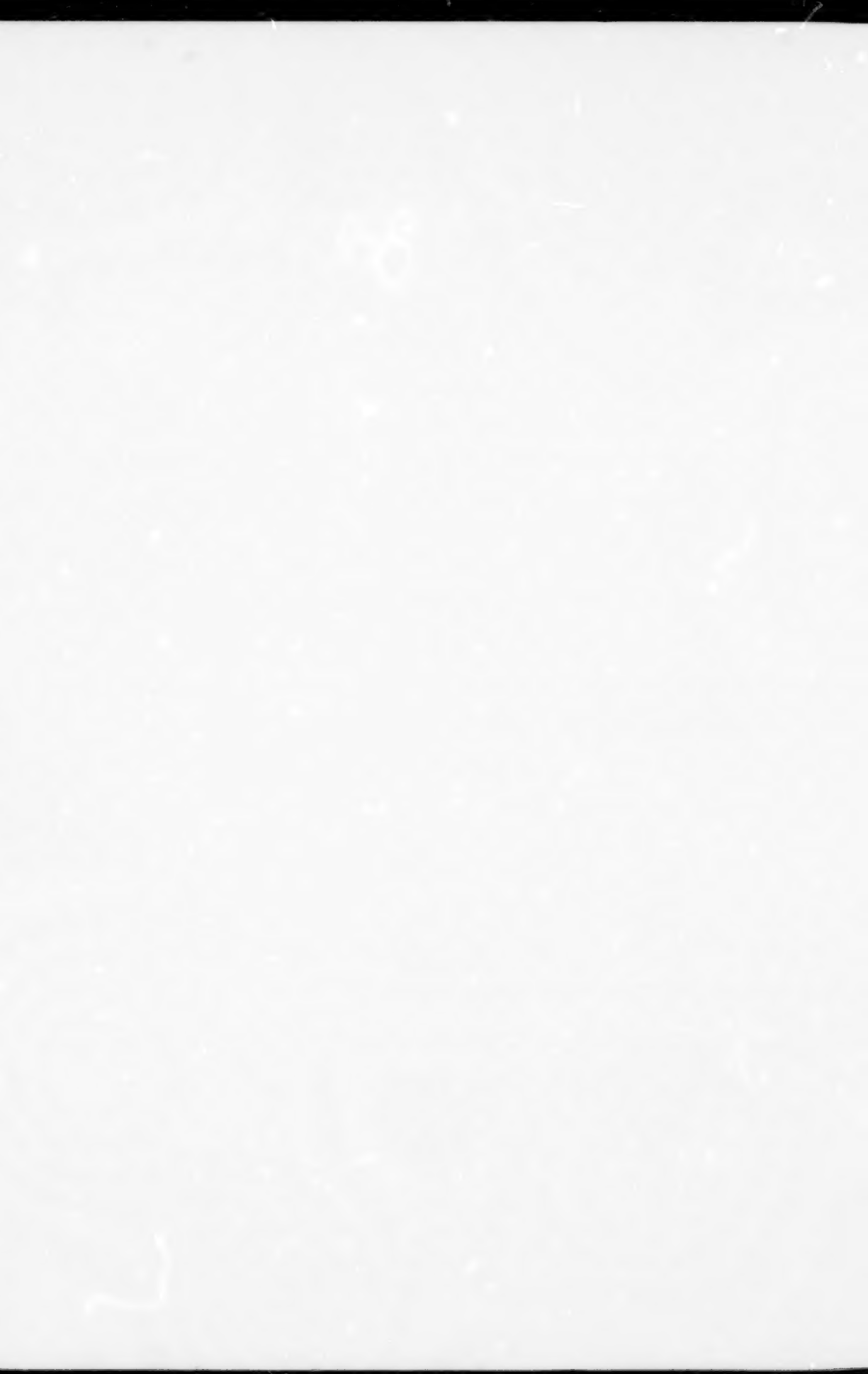


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1.0 INTRODUCTION

A recent survey by Milstein [22], suggests that 27% of all hospital admissions are either due to, or associated with, alcohol or drug dependency. These patients have a wide spectrum of admission diagnoses: some are directly related to alcohol or drug dependency, and in some the dependency is a complication of a different admission diagnosis. However, at the least this patient subset represents a very substantial use of hospital resources in a heavily burdened system responding to societal and technological change.

The cost of alcohol and drug dependency, for many jurisdictions and in many countries, has been estimated generally from macro-economic data and averaging techniques [28,19]. Specific case studies have provided average cost per patient using global hospital or insurance data. Results of these studies show a wide range of order-of-magnitude costs: for example 3.8% to 12% of all medical costs [25, 23]; 497 million (UK£) (1986) to 1.6 billion (US\$) (1986) [17, 10]. Results reported reflect different jurisdictions and different social service and health care delivery mechanisms. They differ in what is included or excluded from costs and in criteria for determining the population that is costed. For example, excess Health Care annual costs for alcohol dependency in Canada have been estimated at \$2,879,000,000 and for British Columbia at \$396,000,000 [2]¹. Notwithstanding such order-of-

¹ Estimates were calculated for the Alcoholism and Drug Addiction Research Foundation from Statistics Canada data (1981). They have been adjusted to 1988 dollars for this report using the consumer price index.

magnitude figures based upon estimated prevalence and reported morbidity data, there is a serious deficit of accurate information specific to British Columbia.

Identification of alcohol and drug dependent individuals remains elusive. Reasons, including denial, societal and physician bias and lack of uniform documentation standards have been cited, but little is offered in the way of practical solutions [4,8,12,23,27,31].

Some studies have reported the effectiveness of specific intervention programmes [24]; however information describing treatment efficiency is lacking, largely because of the inability to monitor programme and population disease frequency, and hence costs [14,17,19].

1.1 PROBLEM STATEMENT

There is a deficiency of information, databases and models for programme evaluations, cost-benefit analyses, policy analysis and policy design for alcohol and drug dependency. Even in the face of evidence describing the magnitude of the problem, these data are not sufficient for such analyses and design because they are coarse estimates and do not offer the potential for feedback on the effect of policy choices or programmes already in place in British Columbia.

Even though order-of-magnitude figures are available for the global costs of alcohol and drug dependency, there are no reliable measurements of the costs of such patients in the hospital system. Simple extrapolation of admission figures is inadequate for the estimation of hospital costs; a direct measurement technique seems desirable, but forbiddingly complex. It is known that the alcohol and drug dependent population, and their families, use the hospital system more frequently than the non-dependent population, and it is probable that the course of illness

when complicated by such dependency is more expensive than the non-dependent cohort. Moreover, many admissions are directly due to alcohol or drug dependency, and could perhaps be entirely or partially prevented by societal, educational, legal and other strategies. Also, the hospital is a community focus, linking the dependent patient to a variety of community agencies and facilities; the hospital Alcohol and Drug Dependency database will provide a bridge to understanding and costing systems in their entirety [14].

The expense of therapeutic or preventative programmes must, of course, be measured against the potential or actual gain, and to this end, direct measurement of the resources used for these patients (which would not have been used if there were no dependency) is necessary. Recent advances in hospital information technology (Case-Mix or Diagnostic Related Groupings, severity ranking and linkages between clinical and financial data) offer the possibility for the first time of a two phase programme:

1. Identification of patients with an alcohol or drug dependency.
 - (a) Identification of patients where the primary diagnosis is related to alcohol or drug dependency,
 - (b) Identification of patients where the primary diagnosis is complicated by a secondary alcohol or drug dependency, or only partly caused by the dependency.
2. Identification and costing of the resources used by such patients - resources which would not have been used if there were not alcohol or drug dependency.

It is in this context that the present report was initiated, to provide a basic scheme for costing an identified subset of alcohol and drug dependent hospital patients.

1.1.1 Specific Problems of Identification

Identification of alcohol and drug dependency is obscured by inconsistent and uncoordinated documentation by physicians and others, denial by afflicted persons and their family, and societal biases.

- (a) Physicians often exhibit reluctance to label patients as dependent without unambiguous, objective data, especially if the primary medical condition under treatment is not commonly associated with dependencies. There is evidence that alcohol or drug dependence will not be detected in medical examination or may be confused with other conditions [4]. The significance of some narrative description by physicians will not always be recognized by diagnosis coders whose methodology focuses on specific diagnostic phrasing. As a result medical information abstracted for analysis is not necessarily sufficient for identification of the alcohol and drug dependent population.
- (b) Afflicted individuals and their family or friends will deny dependence or may honestly believe they do not have a dependency until they are faced with serious health effects, problems with employers or with relationships with family, friends or society.
- (c) Society will generally tolerate the alcohol or drug dependent individual, particularly males, as long as antisocial behaviour is hidden or controlled. Also alcohol or drug dependency will not be anticipated,

even if well established, if the individual does not fit a stereotype. Thus, females, youth and the socially successful will tend to be ignored while middle aged unemployed or low status males, and natives, will be detected earlier. Once addiction is discovered, a large segment of society is unforgiving especially when the addiction results in incompetence on the job, or if antisocial behaviour such as violence or family abuse occurs; the pressure to keep such affliction hidden is very real.

1.1.2 Specific Problems of Costing

The variety of hospital and medical services used and the intensity of care provided, differs significantly from case to case. To develop a viable database and cost models, these variations must be understood and taken into account. This presents two major areas of difficulty:

- (a) It must be possible to cost each case fully and in detail. In other words, each service (such as nursing, pharmacy or surgery) must be analyzed to determine the cost of each resource component of that service and each case analyzed to determine how much of each resource component was consumed.
- (b) It is not correct to assume that all costs of all cases should be attributed to alcohol or drug abuse; some costs may not be related to the dependency in some cases. It is therefore necessary to analyze individually and carefully those cases where the disease is not caused by alcohol or drug dependency, but is complicated by it.

1.2 OBJECTIVES OF THIS STUDY

This report deals with those patients in which, by a variety of mechanisms, alcohol or drug dependency is clearly and unequivocally identified. The objectives of the study are:

- (1) To develop a methodology for identifying cases that are clearly and unequivocally alcohol or drug related, and in which the entire admission may be attributed to, or caused by, such dependency.
- (2) To develop a methodology for costing in detail, by service, on a case by case basis, such a cohort.
- (3) To provide a total actual cost for this segment of the population with appropriate demographic breakdown.
- (4) To provide standard hospital cost indices.

This is a phased project and at this stage the costing methodology is the most important aspect. Cost indices and rates developed now can be employed in subsequent investigation which intends to focus more on identifying and separating out cases of alcohol and drug dependency where there is uncertainty. Such work will build upon the accuracy and thoroughness of cost information in this report.

Methods developed now will be used to derive a per-case cost. Per-case costing methods are rare but offer advantages over methods that use averages of global statistical and expense data. Such costs are more reliable both for studies of small populations and for large, aggregate populations. Methods must also be flexible, in order to adapt to and take advantage of the many varieties of information that describe hospital utilization and cost.

1.3 RESEARCH ENVIRONMENT

Data were obtained with the cooperation of the Greater Victoria Hospital Society at the Royal Jubilee Hospital (RJH), a division of the Society, which provides 1160 acute care hospital beds to British Columbia's Capital Region. The RJH provides 760 of those acute care beds including a 75 bed Psychiatric Unit.

The RJH provides several outpatient clinics and non-acute beds; these services have not been included in the current phase, although it is clear that they are pertinent to a full study. The RJH does not normally admit paediatric and obstetrical cases, and therefore the proportion of these categories is not representative.

A Chemical Dependency Resource Team, a programme of the Ministry of Labour and Consumer Services, Alcohol and Drug Programmes, is located at RJH.

2.0 IDENTIFICATION OF ALCOHOL AND DRUG DEPENDENCY

Based on hospital encounters, various sources were identified for their potential in selecting and confirming a clearly alcohol and drug dependent population. Each encounter can be identified with an individual patient for further analyses. Patient encounters were identified as clearly alcohol and drug dependent on the basis of:

1. International Classification of Diseases, 9th Revision, Clinical Modification (ICD9-CM)
2. Diagnostic Related Group (DRG)
3. Registration in a Provincial Alcohol and Drug Programme
4. Hospital Admission History

2.1 INTERNATIONAL CLASSIFICATION OF DISEASES, 9TH REVISION, CLINICAL MODIFICATION (ICD9-CM)

Description

Derived from the medical record abstracted after discharge, this classification system is commonly used by hospitals for comparative analysis, for quality assurance, and for special studies including epidemiology. It is primarily a standardized, subjective interpretation of Physician documentation and diagnostic reports.

Criteria

A patient is considered to be clearly alcohol or drug dependent if the diagnosis indicates alcohol or drug dependency. ICD9-CM code classifications which indicate alcohol or drug dependency are as follows:

TABLE 2.1: ICD9-CM Diagnostic Classification

ICD9-CM	DESCRIPTION
291	Alcoholic Psychoses
292	Drug Psychoses
303	Alcohol Dependence Syndrome
304	Drug Dependence
305	Nondependent Abuse of Drugs ²
425.5	Alcoholic Cardiomyopathy
535.3	Alcoholic Gastritis
571	Chronic Liver Disease & Cirrhosis ³
577.1	Chronic Pancreatitis ⁴
790.3	Excessive blood level of alcohol ⁵
980	Toxic Effect of Alcohol ⁶
V11.3	Personal History of Mental Disorder-Alcoholism

² A review of the use of this code revealed that, while seeming to contradict the premise of the study, it was, in fact associated with dependency in most cases. Therefore, except for the necessity of history review to eliminate ambiguous classification, it is a good indicator of dependency.

³ 571.0 Alcoholic fatty liver, 571.1 Acute alcoholic hepatitis, 571.2 Alcoholic cirrhosis of the liver, 571.3 Alcoholic liver damage, unspecified.

⁴ Without contra-indicators present.

⁵ In conjunction with a review of history.

⁶ Ethyl, Methyl, Isopropyl and unspecified alcohols.

Discussion

These are major categories and in some cases are not sufficiently specific for identifying dependent patients. However, the classification system provides subcategories which were used to reduce ambiguity when necessary.

Discharge abstracts have been found lacking because they fail to include all diagnoses and they vary by the documentation style of the attending physician. For example, if a physician bias against documenting alcoholism or drug addiction exists, a choice of phrase that is not sufficiently clear for standard methods of coding may result in a different ICD9-CM code, or there may be an omission of this diagnosis by the physician if it is not the diagnosis being treated.

Differences in diagnoses arrived at by subjective methods (e.g. coding) and objective methods (e.g. laboratory testing) have been recorded and therefore a bias is suspected. Bias may be unintentional, if seen to be irrelevant to presenting symptoms and treatment, or intentional, if seen to be as unnecessary labeling and possibly compromising patient-physician confidences. Gross misrepresentation is not suspected or inferred; however, one might expect to underestimate a population by relying on ICD9-CM codes. Nevertheless, once recorded, this classifier is a formal and reliable assessment of the condition alone or when used in conjunction with a review of medical history.

Method

The ICD9-CM codes for each encounter were obtained from computer records of hospital discharges. If the three digit major category was sufficiently clear, it was used alone, and if not, a sub-category (fourth and fifth digits) was considered. If the

diagnostic code was ambiguous, it was accepted as an indicator of dependency if the medical chart and history provided additional support.

2.2 DIAGNOSTIC RELATED GROUPS (DRG)

Description

Based upon research for Prospective Payment Systems, this classifier is derived from the medical record abstracted at the time of discharge. It was developed for the purpose of grouping patient admissions with similar cost profiles and originated in the United States of America.

Criteria

A patient is considered to be clearly alcohol or drug dependent if he or she belongs to one of the Diagnostic Related Groups in Table 2.2.

TABLE 2.2: Diagnostic Related Group Identifiers

DRG	DESCRIPTION
202	Cirrhosis and Alcoholic Hepatitis
433	Alcohol/Drug Abuse or Dependence Left Against Medical Advice
434	Alcohol/Drug Abuse or Dependence Detoxification or Other Symptomatic Treatment With C.C.
435	Alcohol/Drug Abuse or Dependence Detoxification or Other Symptomatic Treatment Without C.C.
436	Alcohol/Drug Dependence With Rehabilitation Therapy
437	Alcohol or Drug Dependence with combined Rehabilitation and Detoxification Therapy

Discussion

DRGs have a useful role in Canadian Health Care planning despite the legitimate criticism that Canada's orientation to cost minimization, as compared with profit maximization of private Health Care in the US, requires a distinctly Canadian approach to grouping patients for economic analysis. For planning purposes, DRGs provide a broad classification of patients into groups using similar resources, with generally larger samples more easily adapted for statistical comparisons. However, it is imperfect because few DRGs are specific to alcohol and drug dependency and because both physician documentation and the abstraction methods can fail to capture all the diagnoses. Furthermore, it offers no better identification than more detailed diagnosis and procedure codes (e.g. ICD9-CM) from which DRGs are derived at this hospital.

Nevertheless, because some DRGs are sufficiently specific to alcohol and drug dependency and because not only diagnoses but also procedure information is used to derive a DRG, it can be considered for identification. We would expect, however, that DRGs will identify fewer cases than ICD9-CM.

Method

The DRG code for each encounter was obtained from computer records of hospital discharges.

2.3 REGISTRATION IN A PROVINCIAL ALCOHOL AND DRUG PROGRAM

Description

Acceptance by a community agency involved in the care and treatment of dependent individuals may conclusively identify alcohol or drug dependence because of the very nature of the services provided. For this study, the Chemical Dependency Resource Team (CDRT), an agency that provides a bridge between the hospital and the community with respect to the care and treatment of alcohol and drug dependent patients, provided the means to consider these sources of information. Hospital patients have the opportunity of being referred to, or referring themselves to, the CDRT, who intervene and arrange treatment and community support for the patient. Although operating at the Royal Jubilee Hospital, the team is funded separately by the Ministry of Labour and Consumer Services, Alcohol and Drug Programmes.

Criteria

CDRT acceptance is conclusive evidence of alcohol or drug dependency.

Method

The CDRT Registry includes a hospital identification number and was available in manual (paper) records. Encounter numbers were assigned by cross-referencing admission and discharge dates with CDRT referral dates.

2.4 ADMISSION HISTORY

Description

Cases resulting in additional direct health care costs can be uncovered through analysis of patient history of an identified dependent individual. These cases may be clearly alcohol or drug related because of a medical association even if a specific diagnosis is omitted.

Criteria

If the recent admission history includes alcohol or drug dependency (e.g. within six months), then all admissions within the study period should be considered to be a result of the dependency. These discovered admissions should be labelled as alcohol or drug dependent subject to a medical evaluation of the history in order to avoid including admissions that are a result of conditions that existed prior to or independently of such condition.

Method

For this study, a six month period was chosen. Previous and subsequent encounters for patients already identified as alcohol or drug dependent were obtained from computer records of hospital discharges.

2.5 ADDITIONAL SOURCES

A number of potentially useful identification methods were not systematically studied for this phase of research, although some preliminary investigation was done. It seemed likely that the population of alcohol and drug dependent patients would only be expanded minimally, and probably not sufficiently to warrant

attention at this time given the present focus. The following were investigated for potential in future phases and similar studies:

2.5.1 Biochemical and Haematological Analysis of Blood and Urine

Specific laboratory tests are objective indicators of alcohol or drug dependency or abuse. Abnormal liver function indicated by high levels of liver enzyme Gamma Glutamyl Transpeptidase (GGT), coincident with abnormally high Mean Corpuscular Volume (MCV), is persuasive evidence of serious abuse of alcohol.

A non-zero blood ethyl alcohol, at minimum, adds weight to other evidence of alcohol dependency and may of itself be a marker that indicates a potential dependency, according to the National Council for Alcohol Abuse. Drug screening tests for specific substances are evidence of chemical dependency.

Laboratory results were obtained from the patient chart and it was determined that of the 178 patient encounters abstracted, 10 had abnormally high GGT and MCV levels and 41 had a non-zero blood ethyl alcohol level. These figures are by no means representative of the total sample and the information will be systematically captured in later phases.

2.5.2 Chart Review for Key Phrases

Given previous comments regarding the structured methods of obtaining ICD9-CM and DRG codes from physician documentation, some of these limitations can be overcome through separate review of the medical record, specifically for alcohol and drug dependency. Evidence gathered in this fashion would include key phrases that are not fully reflected in discharge abstracts.

Key phrases were not systematically collected for this phase, and will be investigated in future research.

2.5.3 CAGE Questionnaire

Interview techniques have been used successfully in several studies [4, 22]. The CAGE questionnaire is able to uncover four key markers of alcohol addiction: The desire to gut-down, annoyance with comments and criticism of others, guilt, and use of alcohol as an eye-opener. The use of the CAGE questionnaire was specifically precluded by the retrospective nature of this work. The questionnaire is believed to substantially increase the population sample when used in concurrent studies [22].

2.6 SUMMARY

Using the criteria described above, it was possible to identify 556 encounters representing 438 patients. Our methodology ascribed an unambiguous identification based on ICD9-CM and DRG codes and on CDRT registry data. From these patients, it was possible to extend the sample by uncovering admissions that would have been undetected except for their association with alcohol or drug dependency in the admission history.

The majority of patients were identified by ICD9-CM coding, which included 100% of those identified by DRG and 85% of those identified from the CDRT registry. The hospital admission history uncovered another 11% of the encounters.

3.0 COSTING ALCOHOL AND DRUG DEPENDENCY

To determine the costs of alcohol and drug dependencies, a comprehensive patient costing methodology has been developed. Costs are calculated using treatment details extracted from various hospital information systems and from the patient chart, accumulated into individual hospital encounters. Added to the cost of each hospital encounter are associated non-hospital costs such as visits to the Chemical Dependency Resource Team and Medical Fees.

Since patients identified in this phase of the study are being treated solely as a result of diseases caused by alcohol or drug addiction, the full cost of any treatment provided is considered to be dependency related. Therefore, methods of partial cost calculation were not required.

Each encounter was costed individually in terms of 16 services or cost centres, including the non-hospital costs of CDRT and Medical Fees, incurred during the hospital stay, which are paid by the British Columbia Medical Services Plan. These cost centres are:

Diagnostics and Treatment

- Chemical Dependency Resource Team (CDRT)
- Electrodiagnostic Services
- Laboratory
- Medical Fees
- Medical Imaging
- Nuclear Medicine
- Nursing
- Occupational Therapy
- Pharmacy
- Physiotherapy
- Social Work
- Surgery

Accommodation

- Admitting (Registration, Scheduling, Records, etc.)
- Dietary
- Hotel (Laundry, Linen)
- Institutional (Plant, Administration, Housekeeping, etc.)

This breakdown includes all of the high cost services within the hospital. Unique costing methods were required for each of the above areas to accommodate the differing levels of cost detail available. To collect service details, computerized patient care and financial information systems were employed where possible and otherwise, patient charts and department records were manually examined. Costing methods already in place were adapted to the study but in many cases costing methods had to be developed individually.

For each service, the availability and variability of costing data determined which level of detail would be used:

- (1) A standard cost per encounter.
- (2) A standard cost per day of stay, aggregated for the total length of stay.
- (3) A standard cost per treatment or procedure, aggregated for all treatments received during the hospital stay.
- (4) A variable cost per treatment or procedure which depends upon the methods used, aggregated for all treatments received during the hospital stay.

Services whose costs exhibit low variability are quite reasonably represented by a standard cost for the encounter or for each day of stay. Services whose costs exhibit high variability require separate costs for each treatment or procedure (such as medications or x-rays) as a basis for total cost, or if possible, variable costs that reflect

the different methods of completing a procedure (as with laboratory analysis or nursing care).

Sections 3.1 through 3.16 describe the approach taken for each service that was costed. Unless otherwise noted, costs were derived from detailed analysis of inventory and labour data, including administrative overheads. In many cases it was possible to take advantage of advanced hospital costing techniques installed or being developed at the Greater Victoria Hospital Society.

3.1 ADMITTING

Definition

Admitting costs are incurred only on admission or discharge of a patient for activities such as booking, registration, bed assignment, medical abstracts and record keeping, which are associated with the Admitting and Health Records departments.

Method

A standard cost for each encounter was derived from the total annual budget and the total number of yearly admissions as a simple average.

It was possible to take advantage of standard costs prepared for casemix costing projects being developed at the hospital.

3.2 CHEMICAL DEPENDENCY RESOURCE TEAM

Definition

Chemical Dependency Resource Team costs are the total direct and indirect cost per patient and, pro-rata, any administrative overheads associated with the CDRT.

Method

A standard cost for each encounter was derived from the total annual budget (allowing for educational and non-patient services) and the annual number of referrals as a simple average.

Cost and incidence data were available exclusively in paper record form requiring special analysis for this project.

3.3 DIETARY

Definition

Dietary costs are made up of food service and dietitian costs, including administrative overheads

Method

A standard cost per day of stay was derived from the total annual budget and the total annual patient days as a simple average.

It was possible to take advantage of standard costs prepared for casemix costing projects being developed at the hospital.

3.4 ELECTRODIAGNOSTIC SERVICES

Definition

Electrodiagnostic costs are the technical and overhead costs for each procedure or diagnostic test, exclusive of the medical fee component, which is reported separately.

Method

The incidence of each Electrodiagnostic Services (EDS) procedure was manually abstracted from the patient chart for each patient encounter. A standard cost per test or procedure was aggregated for all tests or procedures received during the hospital stay.

It was possible to take advantage of standard costs prepared for casemix costing projects being developed at the hospital. However, incidence data were available exclusively from the medical record requiring special analysis for this project.

3.5 HOTEL

Definition

Hotel costs are the patient specific daily costs for accommodation. Laundry, linen, and housekeeping make up this cost centre.

Method

A standard cost per day of stay was derived from the total annual budget and the total annual patient days as a simple average.

It was possible to take advantage of standard costs prepared for casemix costing projects being developed at the hospital.

3.6 INSTITUTIONAL

Definition

Costs which are not specifically related to a particular patient, and are required ancilliary and support services, are grouped as institutional costs. Such support services include plant maintenance, accounting, and computer services.

Method

A standard cost per day of stay was derived from the total annual budget and the total annual patient days as a simple average.

It was possible to take advantage of standard costs prepared for casemix costing projects being developed at the hospital.

3.7 LABORATORY

Definition

Laboratory costs include the collection, analysis, and reporting costs for Haematology, Biochemistry, Microbiology, Surgical Pathology, Cytology, Autopsy, and Blood Bank. Pathologist fees are included since they are not directly billed to MSP.

Laboratory costs include bench technologist and pathologist cost, supervisory and administrative overhead, and materials and supplies.

Method

A variable cost per specimen or test dependent upon the methods used was aggregated for all tests received during the hospital stay. Most data capture was automated although some required a detailed chart review of laboratory requisitions and results.

It was possible to take advantage of variable costs and incidence data prepared for diagnostic services decision support projects being developed at the hospital.

3.8 MEDICAL FEES

Medical Fee costs described in this section refer to MSP billings charged for certain hospital procedures involving physicians. These include, for example, the physician component of hospital services such as Surgery, Anaesthesiology, and Radiology, as well as emergency or routine visits with a patient. Methods and assumptions are listed individually for each billable component.

3.8.1 Electrodiagnostic Service Fees

Counts of Electrodiagnostic (EDS) procedures which were used to cost EDS services were also used to cost the professional fee component. The 1988 Guide to Fees provided professional fees for each procedure which were multiplied by the counts and added to the Medical Fee component.

3.8.2 Medical Imaging Fees

Counts of Radiology, Computed Tomography, and Ultrasound procedures which were used to cost Medical Imaging diagnostics were also used to cost the professional fee component. The 1988 Guide to Fees provided professional fees for each procedure which were multiplied by the counts and added to the Medical Fee component. An average cost for the professional fee component was used where procedures had been grouped by standard cost.

3.8.3 Nuclear Medicine Fees

Counts of Nuclear Medicine procedures which were used to cost Nuclear Medicine procedures were also used to cost the professional fee component. The 1988 Guide to Fees provided professional fees for each procedure which were multiplied by the counts and added to the Medical Fee component. Professional fees for Nuclear Medicine blood work were based upon an average of all blood work.

3.8.4 Surgery Fees

Counts of surgical procedures which were used to cost the surgery were also used to cost the professional surgery fee component. The 1988 Guide to Fees provided professional fees for each procedure which were multiplied by the counts and added to the Medical Fee component. In addition, fees for Anaesthetist procedures were calculated from the fee guide, scheduled units for the procedure, and the length of the surgery.

3.8.5 Emergency Fees

A range of fees apply when a physician is called to attend a patient in emergency. These vary depending on whether the physician was already in the hospital and the time of day. The conservative assumption was made that the lowest fee was charged for each admission through emergency. This allows for the possibility that the doctor was already in the hospital or, more likely, that an emergency physician admitted the patient. For some admissions, it was determined that the patient was held overnight for observation. In these cases, the assumption was made that the patient's own physician was called in. The higher rate was used for each admission identified in this fashion.

3.8.6 Routine Patient Visit Fees

The number of visits a physician makes for each patient encounter is based on a number of factors such as admission diagnosis, severity of illness, physician practice, and length of stay. Ward staff were interviewed to determine guidelines for the number of visits by physicians under different circumstances. The following guideline was used to estimate the number of physician visits per encounter:

TABLE 3.8: Guideline for Physician Visits

LOS (In Days)	NUMBER OF PHYSICIAN VISITS
1 - 5	Every Day
6 - 15	Every Other Day (On Average)
> 15	Every Third Day (On Average)

The cost per visit was obtained from the 1988 Guide to Fees and allows for a higher fee for the first visit.

3.9 MEDICAL IMAGING

Definition

Medical Imaging costs include Radiology (X-ray), Ultrasound, and Computed Tomography (CT). Magnetic Resonance Imaging (MRI) equipment was not in operation during the study period but would be considered part of Medical Imaging in subsequent research.

Method

A standard cost per procedure, aggregated for all procedures received during the hospital stay, was obtained by collecting the frequency and type of procedure from the medical record and applying a standard cost to each procedure. Standard costs for these procedures were obtained directly from hospital costing systems where possible and created through an averaging process otherwise.

In order to reduce the volume of detailed information, some assumptions were necessary. For example, if multiple CT procedures were performed during one patient encounter, it was assumed that the procedures were performed in one session. During the manual chart abstraction process, no distinction was made between two head scans performed in one session and one head scan performed in each of two sessions. This is a conservative assumption in that if a separate session was required the costs would be higher. Some procedure costs were averaged by combining those procedures relating to a common examination area if costs were similar.

It was possible to take advantage of standard costs prepared for casemix costing projects being developed at the hospital. However, incidence data were available exclusively from the medical record and from paper records within Medical Imaging requiring special analysis for this project.

3.10 NUCLEAR MEDICINE

Definition

Technologist and overhead costs for Nuclear Medicine are included but not the analysis of blood which is carried out by the Laboratory. Professional fees associated with Nuclear Medicine procedures are reported separately.

Method

A standard cost per procedure, aggregated for all procedures received during the hospital stay was obtained by collecting the frequency and type of procedure from the medical record and applying a standard cost to each procedure. Standard costs for these procedures were obtained directly from hospital costing systems where possible and created through an averaging process otherwise.

In order to reduce the volume of detailed information, some assumptions were necessary. For example, some procedure costs were averaged by combining those procedures relating to a common examination area if costs were similar.

It was possible to take advantage of standard costs prepared for casemix costing projects being developed at the hospital. However, incidence data were available exclusively from the medical record requiring special analysis for this project.

3.11 NURSING

Definition

Nursing costs consist of labour costs for direct patient care provided by nursing staff including administrative and supply overhead.

Method

A variable cost per patient per day was aggregated over the total length of stay. Since costs are almost entirely labour driven for these services, costing methods were based on labour requirements with other costs assigned pro-rata. Intermediate products for nursing care were defined as the intensity of care required each day and this may change from day to day for any given patient. For most hospital wards, patients are assessed daily by nursing for nursing management information. These assessments were used as the basis for counting the number of days at each of five levels of nursing attention required and costs were assigned for each level for each ward.

Some wards do not assess patients and therefore it was necessary to adopt a secondary method for all or part of a hospital stay. A standard cost per patient day for such wards was calculated from total budget and annual patient days and these costs were applied for those days a patient was not on a ward that uses the nursing management information system.

It was possible to take advantage of costs per patient prepared for casemix costing projects being developed at the hospital. Special analysis of paper records was required to supplement the per patient costs for some patients.

3.12 OCCUPATIONAL THERAPY

Definition

Occupational Therapy costs include therapist time and administrative overheads.

Method

Occupational therapy time is routinely recorded for each patient and was used as a basis for determining standard cost and utilization. Time that a patient may be attending group therapy is recorded as a share of the group time and depends upon the numbers in the group. Individual sessions are recorded individually. Both direct and indirect therapist time is recorded. A standard cost per unit of time unit was determined from total costs and total time for all patients and then applied to the time recorded for the patients in this study during their hospital stay.

It was possible to take advantage of incidence data prepared by a Rehabilitation Information system installed at the hospital. Special analysis of paper records was required to determine standard costs.

3.13 PHARMACY

Definition

Pharmacy costs include both drug supply and dispensing and preparation.

Method

A variable cost per medication was determined on the basis of drug cost, dose,

frequency of medication and method of application (e.g. oral, topical, subcutaneous). These costs were aggregated for all medications received during the hospital stay.

The data on which to base these costs were abstracted from the patient chart. Generally, drug cost was available from inventory data but when chart data was not sufficiently specific for costing, standard costs, either average or typical, were applied. For example, costs often varied depending on the packaging (e.g. 300 tablets/bottle vs. 600 tablets per bottle) but the actual packaging used was not recorded. Cost of drugs manufactured at the hospital were approximated by Pharmacy staff using the cost of the ingredients.

A standard cost for dispensing was derived as an average cost per prescription or refill using pharmacy expense data, exclusive of drug costs. This cost was added to the cost of each medication, taking into account automatic stop-orders as well as new prescriptions. Drugs issued from ward stock (i.e. common medication which is kept on hand in the ward) were not assigned dispensing costs since the pharmacist component is negligible.

Special analysis and interviews with Pharmacy staff were required to derive rules for costing medications and determining drug inventory costs. Incidence data were available exclusively from the medical record requiring special analysis for this project.

3.14 PHYSIOTHERAPY

Definition

Physiotherapy costs include therapist time and administrative overheads.

Method

Physiotherapy time is routinely recorded for each patient and was used as a basis for determining standard cost and utilization. Time that a patient may be attending group therapy is recorded as a share of the group time and depends upon the numbers in the group. Individual sessions are recorded individually. Both direct and indirect therapist time is recorded. A standard cost per unit of time unit was determined from total costs and total time for all patients and then applied to the time recorded for the patients in this study during their hospital stay.

It was possible to take advantage of incidence data prepared by a Rehabilitation Information system installed at the hospital. Special analysis of paper records was required to determine standard costs.

3.15 SOCIAL WORK

Definition

Social Work costs include social worker time and administrative overheads.

Method

Social Work time is routinely recorded for each patient and was used as a basis for determining standard cost and utilization. Both direct and indirect worker time is recorded. A standard cost per unit of time unit was determined from total costs and total time for all patients and then applied to the time recorded for the patients in this study during their hospital stay.

Both costing and incidence data were available exclusively in paper record form, requiring special analysis for this project.

3.16 SURGERY

Definition

General setup costs, time based costs for operating room nurses and post-anaesthetic recovery, and actual costs for materials used, including prostheses are included in surgical procedure costs. Surgeon and Anaesthetist fees are recorded separately.

Method

A standard cost for each procedure was determined from a detailed analysis of labour, supplies, and instrument costs for each procedure and allowing for differences in surgeon preferences and technique. These standard costs were aggregated for all surgical procedures received during the hospital stay.

It was possible to take advantage of standard costs prepared for casemix costing projects being developed at the hospital.

4.0 FINDINGS

This study examined a subset of the alcohol and drug dependent population which is clearly dependent and whose costs are assumed to be entirely a result of the dependency. Therefore, total cost figures are understood to refer to this narrow population and reflect only a partial cost over all.

The alcohol and drug dependent sample studied is comprised of 556 encounters during the period July 1, through December 31, 1988. Of these 556 encounters, 178 were costed individually.

4.1 TOTAL COST

Based upon the 178 encounters that were individually costed, it was possible to project a total annual cost of \$3,100,000⁷ for this segment of the population at the Royal Jubilee Hospital. This amount includes a cost for the Chemical Dependency Resource Team, which is a programme that is not characteristic of hospitals in British Columbia. Otherwise component costs were felt to fairly represent acute care costs in the Province with respect to the population studied because of a low incidence of "high-tech" cases which are characteristic of large referral hospitals but not of smaller community or regional hospitals. Furthermore, the higher average cost of short hospital stays and lower average cost of longer stays were taken into account.

After removing CDRT costs, it was possible to calculate a projected cost for the Province of British Columbia using Provincial health statistics for 1988. This resulted in an estimate of \$72,000,000 province wide for this subset of alcohol and drug dependent patients. This estimate is based upon 6% of admissions found to

⁷ The projected amount also includes medical fees billed during the hospital visit.

result from alcohol and drug dependency in this study. Concurrent research underway in B.C. for the Ministry of Labour and Consumer Services, Alcohol and Drug Programmes, has indicated that one can expect up to 27% of hospital admissions to have an alcohol or drug dependency. A simple extrapolation (\$320,000,000) is not appropriate however, since only part of the hospital cost for patients whose admission was not caused by their dependency should be included.

4.2 HOSPITAL INDICES

The average length of stay was 9 days for this sample, slightly higher than the 7.7 days average for all patients at the Royal Jubilee Hospital during 1988. In our sample, 24% stayed only 1 day, and 40% stayed 3 or fewer days in hospital. Three patients with lengths of stay exceeding 100 days were excluded from analysis.

There was reason to suspect that a longer stay, on average, could result from the inclusion of psychiatric beds in the study. This was investigated but it was found that these psychiatric patients exhibited the same average length of stay as non-psychiatric patients.

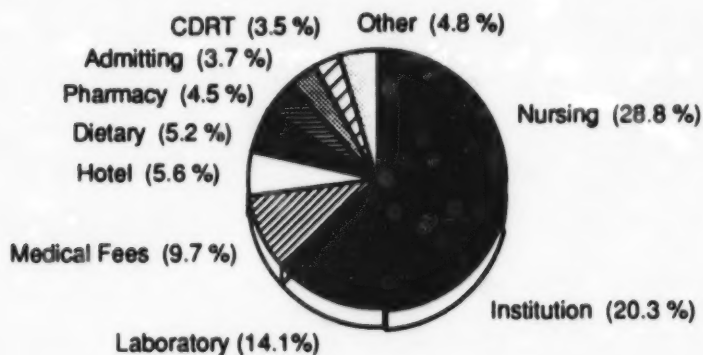
Excluding CDRT costs, the average patient cost \$470 per day. Average costs varied with length of stay. For example, the average cost for patients who had only a single day of stay (overnight) was \$813. The average cost for an encounter (hospital stay) was \$2,690.

4.3 HOSPITAL COST PROFILE

4.3.1 Distribution of Cost by Service

Each encounter was costed individually in terms of 16 services or cost centres, including the non-hospital costs of CDRT and Medical Fees. The distribution of cost by service is illustrated in Figure 4.3.1

FIGURE 4.3.1: DISTRIBUTION OF COST BY SERVICE



The annual cost of this population at this institution is given in Table 4.3.1

TABLE 4.3.1: ANNUAL COSTS BY SERVICE

Service	Annual Cost	Percentage
Nursing	\$888,296	28.8%
Institution	\$626,378	20.3%
Laboratory	\$434,517	14.0%
Medical Fees	\$297,742	9.7%
Hotel	\$171,627	5.6%
Dietary	\$159,037	5.1%
Pharmacy	\$138,123	4.5%
Admitting	\$114,368	3.7%
CDRT	\$106,677	3.5%
Medical Imaging	\$56,350	1.8%
Surgery	\$25,531	0.8%
Occupational Therapy	\$16,181	0.5%
Physiotherapy	\$12,923	0.4%
Social Work	\$12,775	0.4%
Electrodiagnostic Services	\$12,715	0.4%
Nuclear Medicine	\$12,650	0.4%
Total	\$3,085,890	100%

4.3.2 Cost per Day of Stay

Investigation of the cost per day and length of stay for each encounter revealed that costs were skewed such that hospital encounters of short duration produced a high, widely varying cost per day (Figure 4.3.2). This is typical of most acute care hospitals in Canada.

FIGURE 4.3.2: AVERAGE COST PER DAY BY LENGTH OF STAY

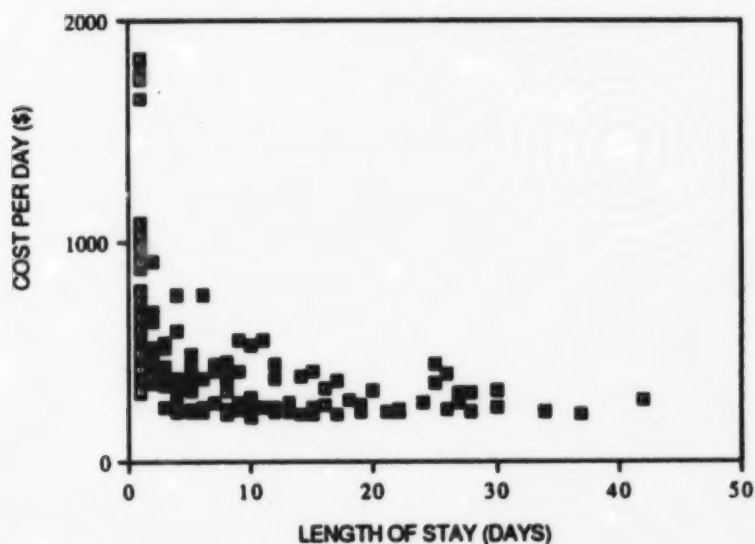


Table 4.3.2 indicates the range of costs that are applicable.

TABLE 4.3.2: AVERAGE COST PER DAY BY QUARTILE

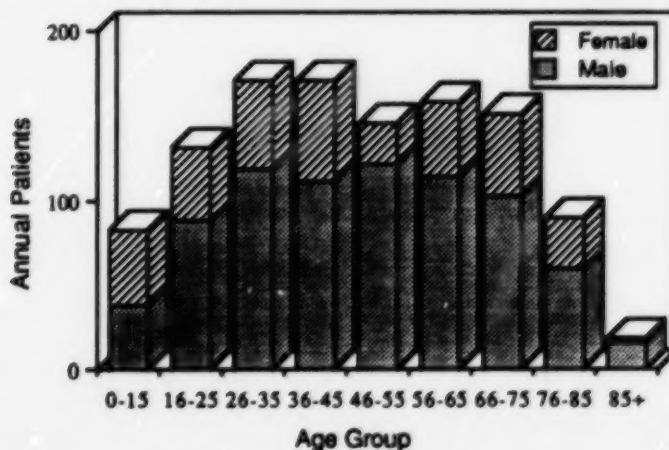
	PROPORTION	LENGTH OF STAY	AVERAGE COST PER DAY
1	25%	1 day	\$813
2	25%	2-4 days	\$434
3	25%	4-10 days	\$343
4	25%	11+ days	\$286

The cost per day by principal diagnosis was investigated to determine if diagnosis can be used as a predictor of cost for this population. Findings were inconclusive. While one would expect intensity of care, and hence cost, to be correlated to the diagnosis being treated, the analysis showed no such correlation. It is possible that a larger number of cases could detect such a relationship but more likely, the essential factor is the severity of illness which is treated aggressively at the beginning of a hospital stay. This aggressive treatment is severity linked but not diagnosis linked, accounting for both the high cost and variability of cost per day for short encounters.

4.4 DEMOGRAPHICS

Male patients comprise 69% of the population and female patients 31%. The distribution of patients by age and sex is illustrated in Figure 4.4.

FIGURE 4.4: ANNUAL PATIENTS BY AGE AND SEX



4.5 DIAGNOSTIC PROFILES

4.5.1 Diagnostic Related Group Profile

The sample of chemically dependent patients were classified by 158 different Diagnostic Related Groups (DRG). The ten most prevalent diagnostic groups identified in the study are illustrated in Figure 4.5.1.

FIGURE 4.5.1: TOP 10 DRGs BY FREQUENCY OF ADMISSION

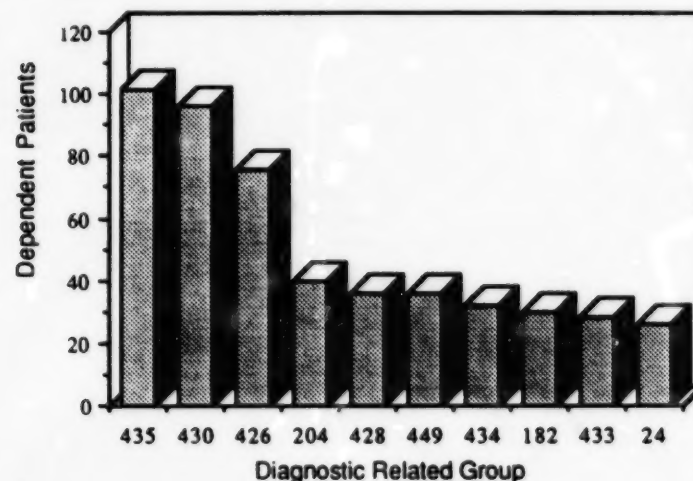


TABLE 4.5.1: FREQUENCY OF ADMISSION BY DIAGNOSTIC RELATED GROUP

DRG CODE	DESCRIPTION	DEPENDENT PATIENTS	ALL PATIENTS
435	Alcohol/Drug Abuse or Depend. Detox. or Other Symptomatic Treat without C.C.	102	102
430	Psychoses	96	848
426	Depressive Neuroses	76	224
204	Disorders of Pancreas Except Malignancy	40	60
428	Disorders of Personality & Impulse Control	36	108
449	Poisoning & Toxic Effects of Drug Age > 17 with C.C.	36	66
434	Alcohol/Drug Abuse or Depend. Detox. or Other Symptomatic. Treat with C.C.	32	32
182	Esoph/Gastro. & Misc. Digestive Disorders Age > 17 with C.C.	30	198
433	Alcohol/Drug Abuse or Depend. Left Against Medical Advice	28	28
024	Seizure & Headache Age > 17 with C.C.	26	48

4.5.2 ICD9-CM Profile

The 556 encounters in the sample represent 158 different primary ICD9-CM diagnosis codes. The top ten ICD9-CM codes by annual frequency are shown in Figure 4.5.2.

FIGURE 4.5.2: TOP 10 DIAGNOSES BY FREQUENCY OF ADMISSION

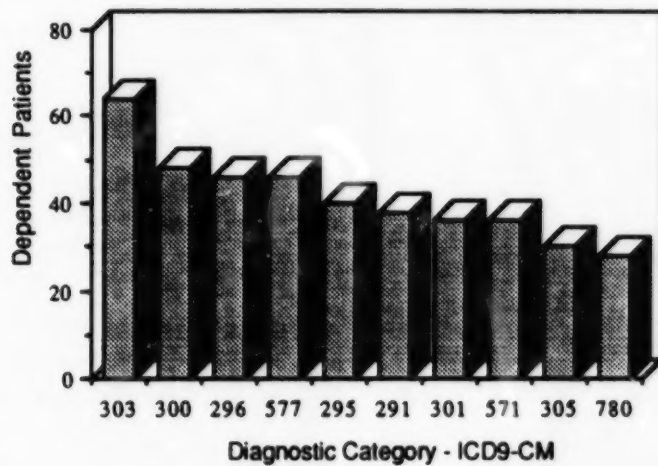


TABLE 4.5.2: Diagnostic Category Data

ICD9-CM	DESCRIPTION	ANNUAL ADD PATIENTS	ANNUAL PATIENTS
303	Alcohol Dependence	64	64
296	Affective Psychoses	48	372
300	Neurotic Disorders	48	156
577	Diseases of Pancreas	46	80
295	Schizophrenic Disorders	40	408
291	Alcoholic Psychoses	38	38
571	Acute and Substance Necrosis of Liver	38	40
301	Personality Disorders	34	104
305	Nondependent Abuse of Drugs	30	30
780	General Symptoms	28	115

5.0 CONCLUSIONS

Until recently, hospital and community statistics have given an incorrect picture of the frequency of alcohol and drug dependent patients. Only those cases that survived the medical, coding, and attitudinal biases were included in the reports, and even then there was no adequate allocation of costs to this population. In order to devise effective strategies to support a growing societal demand to address this problem, it is first necessary to identify the population at risk, the segments of this population and their interrelationships, and the costs attributable to these segments.

One major focus for this type of study must be the acute general hospital. It is here that high costs occasion great societal concern; it is here that the dependent person eventually attends for treatment; it is here that community inter-links are more easily forged. Within the hospital, there are three patient populations which need study:

1. Those patients in whom alcohol and drug dependency induces disease of a florid, recognizable type, and in whom virtually all costs can be attributed to the dependency.
2. Those patients in whom the disease etiology is multifactorial, and in which some cases are caused by drugs or alcohol and other cases may have other etiology; these cases may be less obviously linked.
3. Those patients in whom the reason for admission is not related to drugs or alcohol, but in whom the dependency causes complications or extends the length of stay or intensity of service.

This study has concentrated on the first type of patient in an attempt to elucidate problems of identification, and allocate cost factors accruing as a result of the

dependency. The results indicate that there is a substantial population, easily identified, in which alcohol and drug dependency related costs approximate total costs for these patients. We identified 556 such in-patient encounters in a six month period in which 8973 total encounters for the hospital occurred. These figures (6.2% of encounters) should be considered in the light of the recent Milstein [22] survey indicating that 27% of hospital patients exhibited alcohol or drug dependence when measured by a comprehensive, multifaceted survey including a questionnaire. It is clear that in terms of identification, traditional coding methods, on which virtually all government statistics rest, are inadequate; furthermore, previous statistics do not remotely indicate the extent or cost of the problem.

Small increments of chart review in this study additional to coding methods have increased the identification rate, and our use of referral to the Chemical Dependency Resource Team as an indicator offered a further increment, and a still greater potential. The potential of the CDRT as an identifier is limited by medical staff and hospital policies which allow referral only when initiated by a physician, since physician denial has already been identified as a major obstacle. Hospital policies encouraging multi-disciplinary referral sources, and potent identification weapons such as the CAGE questionnaire, may facilitate the identification of this large and costly in-patient population.

The costs associated with this small easily identified population are considerable. In this study, over 1100 admissions annually costing \$3,100,000 have been identified. In general, these easily identified patients do not belong to the "high-tech" group in which alcohol and drug dependencies are much more difficult to identify, but have a high proportion of psychiatric and "medical" diagnoses of single type. It is important to recognize that the great bulk of these hospital based costs could have

been avoided; this is a disease which if treated early promises an 80-85% potential long term remission rate. Moreover, where treatment is required, this treatment, at least in the early stages, can be delivered in less expensive community facilities.

Grouping by ICD9-CM shows that the easily identified group contain a high percentage of psychiatric admissions. This distribution may be viewed as contributory to the problems of psychiatric bed overload, inhibiting other admissions which may benefit from in-patient treatment and which are not so amenable to community based programmes. Provincial extrapolations from the ICD9-CM may be meaningful even though calculated without benefit of a comprehensive analysis of provincial demographics and disease profiles. This study population comprises ICD9-CM codes which are common to most hospitals, with only a tiny representation of "tertiary-referral" diagnoses. If this sample extrapolation is undertaken, it appears that approximately \$72,000,000 of potentially avoidable costs are allocated to this sub-population.

There is need to do longitudinal costing studies encompassing the medical history, hospital stay, and subsequent or prior community agency based treatment, to appreciate the total health costs of these patients and to add these costs in to the social service, legal, and other societal costs resulting from this disease. The costing and identification methods used in this study can be adapted easily to such situations.

Thus, the high cost of this subset of alcohol and drug dependent patients alone suggests the need for rigorous address; the total attributable costs for the predicted 27% of dependent patients, using only a proportion of the total hospital costs, should be identified to underline the need for investment in preventative strategies and more appropriate treatment systems.

BIBLIOGRAPHY

- [1] Adrian, M. (1988). Social Costs of Alcohol. *Canadian Journal of Public Health*, 79:316-322.
- [2] Adrian, M., & Shehadeh, V. (1986). Costs of Alcohol Problems with Province by Province Estimates. ARF Internal Document, Alcoholism and Drug Addiction Research Foundation, Toronto, (76):1-23.
- [3] Ashton, T., & Cassewell S. (1984). Estimated Cost of Alcohol to the New Zealand Public Hospital System. *New Zealand Medical Journal*, 10:683-686.
- [4] Baresford, T., Low, D., Adducis, R., et al. (1982). Alcoholism Assessment on an Orthopaedic Surgery Service. *The Journal of Bone and Joint Surgery*, 64-A(5):730-733.
- [5] Botz, C.K., & Singh, C. (1984, Mar). St.Joseph's Unit-Costing System: An Effective Tool. *Dimensions*, 16-17.
- [6] Burik, D., & Nackel, J. (1981). Diagnosis-Related Groups: Tool for Management. *Hospital and Health Services Administration*, 26:25-40.
- [7] Crawford, R., & Ford, K. (1984). Humanitarian and Financial Costs in Alcoholics: A Preliminary Study of 15 Cases. *New Zealand Medical Journal*, 25:481-484.
- [8] Crofton, J. (1987). Extent and Costs of Alcohol Problems in Employment. *Alcohol and Alcoholism*, 22:321-325.
- [9] Fillmore, K.M. (1984). Research as a Handmaiden of Policy: An Appraisal of Estimates of Alcoholism and Its Cost in the Workplace. *Journal of Public Health Policy*, 5:40-65.
- [10] Gunby, P. (1987). Medical News and Perspectives. *Journal of the American Medical Association*, 258:2023.
- [11] Hallen, J.B. (1981). Health Insurance Coverage for Alcoholism: A Review of Costs and Utilization. *Alcohol World*, 5:16-21.
- [12] Holden, C. (1987). Alcoholism and the Medical Cost Crunch. *Science*, 235:1132-1133.
- [13] Holder, H., & Blose, J. (1986). Alcoholism Treatment and Total Health Care Utilization and Costs. *Journal of the American Medical Association*, 256:1456-1460.

- [14] Holder, H., & Wallack L. (1986, Autumn). Contemporary Perspectives for Preventing Alcohol Problems: An Empirically-Derived Model. *Journal of Public Health Policy*, 324-339.
- [15] Laporte R., Cresanta J., & Kuller L. (1980, Sept). The Relation of Alcohol to Coronary Heart Disease and Mortality: Implications for Public Health Policy. *Journal of Public Health Policy*, 199-223.
- [16] Lucky, J.W. (1987). Justifying Alcohol Treatment on the Basis of Cost Savings. *Alcohol World*, 12(1):8-15.
- [17] Maynard, A., Hardman, G., & Whelan, A. (1987). Data Note-9. Measuring the Social Costs of Addictive Substances. *British Journal of Addiction*, 82:701-706.
- [18] Maynard, A., & Kennan, P. (1981). The Economics of Alcohol Abuse. *British Journal of Addiction*, 76:339-345.
- [19] McDonnel, R., & Maynard, A. (1985). Counting the Cost of Alcohol: Gaps in Epidemiological Knowledge. *Community Medicine, Centre for Health Economics*, 7:4-17.
- [20] McGuire, T., Dickey, B., Shively, G., et al. (1987). Difference in Resource Use and Cost Among Facilities Treating Alcohol, Drug Abuse, and Mental Disorders: Implications for Design of a Prospective Payment System. *American Journal of Psychiatry*, 616-620.
- [21] Mesochow, J., Miller, S., Sexias, F., et al. (1987). The Impact of Cost Containment on Alcohol and Drug Treatment. *Hospital and Community Psychiatry*, 38(5):506-510.
- [22] Milstein, S. (1989, July). Evaluating Effectiveness of the Chemical Dependency Resource Team at the Royal Jubilee Hospital: Sampling Methods and Preliminary Findings. *Personal Communication*.
- [23] Mosher, J., & Jernigan, D. (1988, Spring). Public Action and Awareness to Reduce Alcohol Related Problems: A Plan of Action. *Journal of Public Health Policy*, 17-41.
- [24] Nivan, R. (1985). Alcoholism: The Costs of the Problem and Its Treatment. *Proceedings of the 34th International Congress on Alcoholism and Drug Dependence, Calgary, Alberta*, 2:43-47.
- [25] Parker, D.L., Schultz, J.M. Gertz, L., et al. (1987, Aug). The Social and Economic Costs of Alcohol Abuse in Minnesota. *American Journal of Public Health*, 77(8):982-986.

- [26] Prince, A.K. (1986). Identifying Disease-Drug Cost Indicators Using Diagnosis-Related Groups. *American Journal of Hospital Pharmacy*, 43:1503-1504.
- [27] Safer, D.J. (1987). Substance Abuse by Young Adult Chronic Patients. *Hospital and Community Psychiatry*, 38(5):511-514.
- [28] Scheffler, A., Fawcett, A., Pushkin, J., et al. (1987). Alcohol Related Problems Amongst Selected Hospital Patients and the Cost Incurred in Their Care. *British Journal of Addiction*, 82:275-283.
- [29] Schmidt, W. (1980, Mar). Effects of Alcohol Consumption on Health. *Journal of Public Health Policy*, 25-37.
- [30] Waller, P., Stewart, R., Hansen, A., et al. (1986). The Potentiating Effects of Alcohol on Driver Injury. *Journal of the American Medical Association*, 256:1461-1466.
- [31] Whitcup, S., & Miller, F. (1987). Unrecognized Drug Dependence in Psychiatrically Hospitalized Elderly Patients. *Journal of the American Geriatrics Society*, 35:297-301.
- [32] Wilkinson, A., Leigh, G., Cordingley, J., et al. (1987). Dimensions of Multiple Drug Use and a Typology of Drug Users. *British Journal of Addiction*, 82:259-273.
- [33] Woodfield, A. (1988). Economic Costs of Alcohol-Related Health Care in New Zealand: An Interpretive Comment. *British Journal of Addiction*, 1031-1039.